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Influence of Growth Regulators on Yield and Economics of Custard Apple (*Annona squamosa* L.) Cv. Balanagar

U. K. Thorat, R. M. Dheware* and A. R. Jadhav

Dept. of Horticulture, College of Agriculture, Latur. Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.S. (431402), India

Corresponding Author

R. M. Dheware
e-mail: rmdheware123@gmail.com

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Abstract

The field study was conducted on a well-established custard apple orchard of eight years age at Custard Apple Research Station, Ambajogai, Dist. Beed, during 2016-17, to study the influence of growth regulators on yield and economics of custard apple (*Annona squamosa* L.) Cv. Balanagar. The experiment framed was concentrated to find out effective concentration of GA₃ and NAA as well as their combination for getting high yield of custard apple fruits. In present study, it had been observed that the foliar application of growth regulators was found beneficial for increasing yield of custard apple fruits. While, the combine spraying of GA₃ 25 + NAA 10 ppm twice i.e. before flowering (second fortnight of may) and one month after the first spray is beneficial for getting higher fruit yield of custard apple cv. 'Balanagar' under Marathwada region of Maharashtra.

Keywords: Growth regulators, yield, economics, custard apple

1. Introduction

Custard apple (*Annona squamosa* L.) is the most ancient dry land fruit crop in India. It was originated from tropical region of America and widely distributed throughout the tropics and subtropics. In India, the area under custard apple cultivation is about 35000 ha with the production of 271000 MT. Out of these Maharashtra state contributes 8660 ha area with 59300 MT productions (Anonymous, 2016). The plant growth regulators are effective at very low concentration, hence they are cost effective. Presently growth regulators are given considerable importance for their value in regulating the various growth and development processes in plants. The plant growth regulator like GA₃ is also useful to increase the fruit setting per branch, number of fruits per tree, fruit weight and ultimately increase the fruit yield (Shinde et al., 2008). Application of NAA checks the fruit drop and thereby increased the fruit retention, fruit weight and TSS of the fruits (Singh and Chohan, 1984).

2. Materials and Methods

A field trial on custard apple Cv. Balanagar was conducted at Custard Apple Research Station, Ambajogai, Dist. Beed, during 2016-17. The 8 year Old plants grown at 4 x 4 m₂ spacing were used for the experiment. The experiment was laid out in a Randomized Block Design with 10 treatments viz., T₁: GA₃ 25

ppm, T₂: GA₃ 50 ppm, T₃: GA₃ 75 ppm, T₄: NAA 10 ppm, T₅: NAA 20 ppm, T₆: NAA 30 ppm, T₇: GA₃ 25+NAA 10 ppm, T₈: GA₃ 50 +NAA 20 ppm, T₉: GA₃ 75+NAA 30 ppm and T₁₀: control (water spray) with three replications. The statistical analysis of the data in respect of yield and economics was done according to the standard procedure given by Panse and Sukhatme (1985).

3. Results and Discussion

3.1. Influence on yield attributes

It is revealed from the data (Table 1) that yield of custard apple was significantly influence by foliar application of growth regulators. The maximum number of fruits per tree (67.30), average fruit weight (220.40 g), fruit yield per tree (14.83 kg) and fruit yield per hectare (9.27 t) was recorded under the treatment T₇ (GA₃ 25+NAA 10 ppm) followed by treatment T₆ number of fruits per tree (64.08), average fruit weight (216.08 g), fruit yield tree⁻¹ (13.85 kg) and fruit yield ha⁻¹ (8.65 t). This might be due to effect of gibberellic acid cell enlargement, cell division and increasing the number and size of fruits which ultimately has resulted in higher fruit yield. While as NAA increasing in photosynthetic activity, fruit set by reducing fruit drop and thereby higher number of fruits and ultimately the higherfruit yield. These findings are in accordance with the results obtained by Singh et al. (2007) in aonla, Nkansah et al. (2012) in mango and Prajapati et al. (2016) in custard apple.



Table 1: Influence of growth regulators on yield of custard apple

Treat-ments	No. of fruits plant ⁻¹	Average fruit weight (g)	Yield plant ⁻¹ (kg)	yield plant ⁻¹ (t)
T ₁	48.36	189.04	9.14	5.71
T ₂	58.00	206.56	11.98	7.49
T ₃	51.00	192.60	9.82	6.13
T ₄	55.80	197.42	11.02	6.88
T ₅	62.13	213.64	13.27	8.29
T ₆	64.08	216.08	13.85	8.65
T ₇	67.30	220.40	14.83	9.27
T ₈	60.23	210.20	12.66	7.91
T ₉	53.20	195.10	10.38	6.48
T ₁₀	43.92	187.06	8.21	5.13
SEm±	2.59	6.05	0.55	0.43
CD (p=0.05)	7.72	18.19	1.65	1.28

3.2. Effect of plant growth regulators on economics of custard apple

The data revealed from the data (Table 2), the highest cost of cultivation (₹ 33,183 ha⁻¹) was recorded in the treatment T₉ (GA₃ 75+NAA 30 ppm) followed by the treatment T₈ (₹ 32,043 ha⁻¹), T₃ (₹ 88,400 ha⁻¹) and treatment T₈ (₹ 87,100 ha⁻¹). While, the lowest cost of cultivation (₹ 30,033 ha⁻¹) was recorded in control.

The highest gross monetary returns per hectare (Rs.2,78,100) was recorded in the treatment T₇ (GA₃ 25+NAA 10 ppm) followed by treatment T₆ (₹ 2,59,500) .While, the lowest gross

Table 2: Effect of plant growth regulators on economics of custard apple

Treat-ments	Cost of cultivation (₹ ha ⁻¹)	Gross moneroty return ha ⁻¹	Net moneroty return ha ⁻¹	B:C ratio
T ₁	30723	171300	140577	5.58
T ₂	31413	224700	193287	7.15
T ₃	32103	183900	151797	5.73
T ₄	30393	206400	176007	6.79
T ₅	30753	248700	217947	8.09
T ₆	31113	259500	228387	8.34
T ₇	31083	278100	247017	8.95
T ₈	32043	237300	205257	7.41
T ₉	33183	194400	161217	5.86
T ₁₀	30033	153900	123867	5.12

returns per hectare (₹ 1,53,900) was recorded in control(T₁₀). The highest net monetary returns per hectare (₹ 2,47,017) was obtained in the treatment T₇ (GA₃ 25+NAA 10 ppm) followed by the treatment T₆ (2,28,387). While, the lowest net returns per tree (₹ 1,23,867) was recorded in control (T₁₀).

The results revealed that, the highest benefit:cost ratio (8.95) was recorded in the treatment T₇ (GA₃ 25+NAA 10 ppm) which was closely followed by treatment T₆ (8.34). While, the lowest benefit: cost ratio (5.12) was recorded in control (T₁₀). The variation in benefit: cost ratio due to foliar application of different growth regulators in custard apple were also reported by Prajapati et al. (2016).

4. Conclusion

The yield parameters viz., number of fruits per tree, fruit yield per tree (kg), fruit yield per hectare (t) and average fruit weight were positively influenced by application of treatment T₇ (GA₃ 25+NAA 10 ppm). In the light of the results obtained from this investigation, it can be inferred that spraying of GA₃ 25 + NAA 10 ppm twice i.e. before flowering(second fortnight of may) and one month after the first spray is beneficial for getting higher fruit yield and profitability of custard apple under Marathwada region of Maharashtra. As the results of the present investigation are based on one season data, further detailed experimentations are necessary to confirm findings.

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